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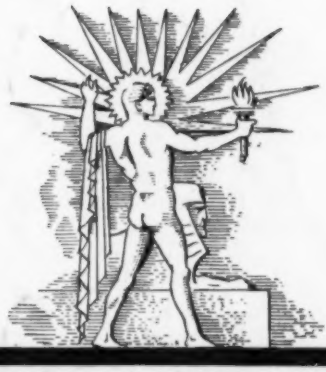
SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE •



July 22, 1939

Test Fire Weapon

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A SCIENCE SERVICE PUBLICATION

Do You Know?

Grasshoppers may fly 15 miles in a day.

In some European countries, deaf persons wear a special sleeve band to indicate their handicap.

The first air conditioned blast furnace is being watched experimentally to see whether it produces more uniform pig iron economically.

A trumpet used in the Bronze Age in Denmark, over 3,000 years ago, is a feature of the Danish pavilion at the New York World's Fair.

Indian monuments and other designs typifying Indian life, past and present, are featured on a number of postage stamps in Pan American countries.

Jams and jellies are becoming by-products of windbreaks in the Plains, where windbreak shrubs often include the wild plum, chokeberry and mulberry.

Indians were so eager to have the bill of an ivory billed woodpecker in a necklace, that northern tribes would give as much as three deer skins for one bill of this southern bird.

Because swordfish are so hard to tag, the Bureau of Fisheries has asked swordfish vessels to number their darts; so that when a fish breaks away carrying a dart there is a chance that later it will be caught again and its career checked.

QUESTIONS DISCUSSED IN THIS ISSUE

Most articles which appear in SCIENCE NEWS LETTER *are based on communications to Science Service, or on papers before meetings. Where published sources are used they are referred to in the article.*

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PHYSIOLOGY

What enzyme protects living cells from poison? p. 61.

PUBLIC HEALTH

At what time of year is an outbreak of horse sleeping sickness most likely? p. 55.

The chief of the U. S. Weather Bureau says: "Weather is the most talked about topic that the human race possesses."

Battle injuries in the World War differed from preceding wars, in that shell wounds were far more numerous than bullet wounds.

The so-called American antelope is not really an antelope; it is a pronghorn, and combines traits of the giraffe, goat, true antelope, and deer.

Scientists report that the floor of the Gulf of California is much rougher and deeper than they supposed.

Orange juice does not lose an appreciable amount of vitamin C for 24 hours, if stored in a refrigerator, latest experiments show.

Eastern states supplied over four-fifths of the United States lumber cut from 1800 to 1935, but the lumber industry is now drifting west.

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ASTRONOMY

Cubic Inch of Dwarf Star Weighs 18,000,000 Pounds

Such Extremely Dense Matter Could Not Be Supported By Any Earthly Substance; Would Drop Right Through

A STAR so heavy that a mere cubic inch of its matter weighs nearly 9,000 tons (18,000,000 pounds) was described to the Singer-Polignac Congress of Astrophysics in Paris by Dr. G. P. Kuiper of Yerkes and McDonald Observatories. Its name is Wolf 457 and it is one of the two strange "white dwarf" stars recently discovered by Dr. Kuiper with the new 82-inch telescope of the McDonald Observatory in Texas.

A piece of this star's extremely dense matter could not be supported by any earthly substance; it would drop through it like lead through air. Its density is half a billion times that of water.

"White dwarfs are self luminous stars with diameters about equal to that of the earth, or only about one per cent. of that of the sun," Dr. Kuiper said. "The largest white dwarfs are about double the size of the earth, the smallest about one-quarter of that size, or about equal to the size of the moon. But although the sizes of the white dwarfs are planetary, the masses are stellar, being about 150,000 to 800,000 times the mass of the earth. Moreover, the smaller the white dwarf, the larger is, on the average, its mass. The average densities (or mean specific gravities of the matter) are therefore of the order of a million times water; they vary from about 100,000 times water for the companion to 40 Eridani, and about 200,000 times water for the companion of Sirius, to roughly half a billion times water for Wolf 457."

The figure given for Wolf 457 is still uncertain, Dr. Kuiper explained, but probably of the right order of magnitude. Other dwarfs, A. C. 70 degrees 8247, Wolf 219, and Ross 627, have mean densities between about 10 million and 100 million times water.

Since the white dwarfs are very faint objects (between about 200 and 14,000 times fainter than the sun) they can only be discovered and studied if they are fairly close to the solar system, say, within 100 light years. For that reason Dr. Kuiper has been examining especially the stars of large proper motion which in general will be located in the solar neighborhood. In this way he has located eight of the 18 white dwarfs now known, including the two faintest objects known.

From the spectra of the white dwarfs, much information is derived about the composition of the atmospheres of the white dwarfs, and about the temperature and the gravity in the atmosphere. The surface temperatures vary between roughly 5,000 degrees and 30,000 degrees Centigrade. Most of the white dwarfs have surface temperatures near 15,000 degrees Centigrade.

"The surface gravities are stupendous from a terrestrial point of view," Dr. Kuiper said. "It is about 40,000 to 50,000 times that on earth for the two bright and relatively large white dwarfs mentioned, and increases to roughly 20,000,000 times that on earth for Wolf 457. In order to appreciate the meaning of these figures one must realize that the weight of every particle is increased by these factors.

"But the effect on the atmosphere of the dwarf is disastrous. The atmosphere would be compressed in the same ratio but for the fact that the high surface temperature somewhat offsets the gravity effect. The resulting atmosphere is only a few feet high, and the matter of the star becomes crushed by the weight of the higher layers already a few tenths of miles below the surface. The weight of the earth is insufficient to change the properties of the deep interior very considerably.

"Equally, in the sun the interior is not radically different from the solar atmosphere; temperature and density are high, but not enough to change the gaseous state of the matter.

"In the white dwarfs the excessive gravity causes the main body of the stars to be composed of crushed matter, built up not of atoms, but of the fragments of smashed atoms: electrons and atomic nuclei. Matter in that state is called degenerate, since it has lost its ordinary character.

"It is a magnificent accomplishment," Dr. Kuiper continued, "that matter in the extreme conditions prevailing in nature at large, as studied by the astronomers, can be fully described and understood by contemporary physics."

SURVIVOR OF CATACLYSM

The Crab Nebula is what remains of a supernova reported in China and Japan in 1054. The nucleus is the remainder of the supernova itself, and it is surrounded with the material ejected during the cataclysm.

Mystery of Universe

SUPER-EXPLODING stars, the supernovae, although they are the most tremendous phenomena yet known to the mind of man, constitute an utter mystery to astronomers, Dr. Henry Norris Russell, of Princeton, dean of American astrophysicists, declared as chairman of the conference.

There seems to be no escape from the conclusion that a supernova may reach such amazing brilliance that it will shine for a few days with light comparable to that given off by a whole galaxy of stars, Dr. Russell explained.

"The fortunate recent discovery of two supernovae, one of the eighth magnitude, in time to permit detailed spectrographic observation, has greatly increased our information, and also our puzzlement," said Dr. Russell. "The spectra, though similar from one supernova to another, are utterly unlike those of any other celestial bodies, so that despite careful study it has not yet been possible to identify a single feature with any radiation known in the laboratory."

Dr. Russell declared that he has not given up hope that the problem of the kind of light emitted by supernovae will be explained by known properties of atoms, perhaps atoms that are moderately ionized, that is, with not more than half-a-dozen electrons stripped from them.

Two supernovae that occurred within the Milky Way, the galaxy in which the sun and earth are located, are authenticated, Dr. Russell said. These are famous Tycho's star of 1572, the brightest ever observed visually, and one recorded in China and Japan in 1054, which survives as the nucleus of the Crab Nebula, which itself represents the material ejected during the cataclysm.

There are lesser exploding stars, the ordinary novae, which are now occurring with extraordinary frequency. Six very conspicuous novae have appeared during the first 40 years of this century, an unequaled record. This happy accident—for astronomers—Dr. Russell attributed to the chance of our position in space because the actual dates of the outbursts differed by many centuries due to the differences in distance from the stars to the earth.

Science News Letter, July 22, 1939

Watch for Outburst

ONLY the outburst of an extraordinary exploding star or supernova in our own Milky Way will reveal to science the beginning stages of these most tremendous explosions known to man, Dr. Walter Baade of Mt. Wilson Observatory, Calif., said.

Only 30 of these supernovae are known to have occurred, and only two are believed to have been in the part of space in which the earth and sun are located. Fourteen of these 30 have been discovered from Mt. Palomar and Mt. Wilson, most of them during the intensive search for supernovae conducted by Dr. Fritz Zwicky and Dr. Baade since the spring of 1936.

Astronomers may not have a chance to observe such a supernova close at hand for many years to come. No one knows when one will occur, but the way they have flashed forth in distant galaxies causes Dr. Baade to estimate that only one supernova in several centuries will occur in a given galaxy. If a supernova happened in our own Milky Way it would be brighter than any star or planet and easily visible in daylight. At peak, a supernova may have the luminosity of 70,000,000 suns.

The interpretation of light given off by supernovae is a mystery at present, Dr. Baade told the conference. No bands in the supernova spectrum have been identified except some oxygen lines that make their appearance 180 days after maximum brightness. A curious and progressive red shift of the spectrum, discovered by Dr. R. Minkowski of Mt. Wilson Observatory, prevents attempts to assign definite wavelengths in the spectrum.

"One of the most surprising results obtained in this spectroscopic investigation of supernovae," said Dr. Baade, "is the remarkable uniformity of the development in all so far investigated. Spectra of different supernovae taken at the same phases are so closely identical even in the minor details that there is a complete lack of individuality as far as the spectra of supernovae are concerned."

Science News Letter, July 22, 1939

Temperature Determined

ONE major mystery of the supernovae, was declared solved by Dr. Cecilia Payne Gaposchkin, Harvard Observatory astronomer, at the Paris conference.

The enigma has been to determine the temperature of these super brilliant stars. Heretofore astronomers have assigned to them such stupendous temperatures as a million degrees Centigrade but Dr. Gaposchkin has shown that their temperature is considerably lower, probably in the range of 15,000 degrees.

Research leading to this finding was conducted with Dr. Fred L. Whipple, also of the Harvard Observatory staff.

The basis for the old million-degree guesses for the supernovae temperatures has been the peculiar appearance of the spectra of these objects. The so-called bright lines by which various component elements are identified are spread out or broadened by some heretofore unknown force. In almost all cases the broadening has been so complete that accurate identification was impossible.

Dr. Gaposchkin has now demonstrated that these high temperatures are not necessary for the observed broadening, that it can be explained as due to the terrifically high velocities of the expanding gases as the stars explode. The speed of these gases is believed to be as high as 4000 miles per second.

To prove her belief Dr. Gaposchkin made certain assumptions concerning the nature of a supernova and then reconstructed its spectrum to see if it checked with the spectra observed from these stars. Specifically, she assumed a temperature of 15,000 degrees Centigrade, comparable to that of ordinary novae; a star composed of elements found in ordinary novae and characteristic of all heavenly bodies—hydrogen, helium, iron, carbon, nitrogen and oxygen; and the estimated explosive velocity of about 4000 miles per second.

This artificially reconstructed spectrum was almost identical, point for point, with the observed spectra of supernovae.

Science News Letter, July 22, 1939

"Babies" Among Novae

THE familiar S. S. Cygni variable stars whose peculiar fluctuations have puzzled astronomers for some time were classified as the babies in the family of novae or exploding stars, by Dr. Sergei Gaposchkin, Harvard astronomer.

The brightness variations exhibited by these peculiar stars are due to the fact that they puff up like balloons, and then, instead of exploding as do ordinary novae, they subside and remain quiet for a while before repeating the entire process.

These stars are unique among celestial bodies, Dr. Gaposchkin said, no other known type of variable stars behaving in this manner.

Their period of fluctuation is about 50 days, Dr. Gaposchkin estimates.

Science News Letter, July 22, 1939

ENGINEERING

Fire Battled Without Usual Water Damage

See Front Cover

CARBON DIOXIDE, the gas you exhale and which when solidified is the "dry ice" that keeps ice cream frozen, has been studied as a destructionless fire extinguishing agent in National Bureau of Standards tests which included deliberate gutting of an old building.

The gas is ordinarily generated in hand fire extinguishers to squirt out with water, but in the tests conducted by Dr. S. H. Ingberg of the Bureau staff the inert gas itself was used to blanket the fire and cut off the air's oxygen. It may some day come into regular fire fighting use in that form though these experiments were only partly successful.

Bureau scientists are seeking a fire extinguisher such as carbon dioxide gas which does not damage papers and furnishings as does water, the foam form of carbon dioxide extinguishers and other chemical agents. At present more damage is often done by the fire extinguishing material than by the fire. The Federal government is particularly interested because of its job of preserving intact and for as long as possible the enormous accumulation of public documents.

Gasoline fires in rooms in a building, which was slated for demolition to make way for a Social Security Board office, were the subject of the tests. Papers were stacked on metal shelves. They were not damaged by the gas. But the test blaze put out by the gas later blazed up again and the building was allowed to burn down.

Carbon dioxide did not prove to be a successful fire fighter in outdoor tests. Because it was blown by wind it failed to put out a 600-gallon gasoline blaze on a pool of water. In another open air test on kerosene, it put out the flames.

Science News Letter, July 22, 1939

BOTANY

Bees Pollinate Flowers In Russian Greenhouses

BEES will fly in Russian greenhouses to pollinate flowers, just as they do outdoors, according to Tass, Soviet telegraphic news agency. Experiments in the greenhouses of the Agricultural Exhibition of the Soviet Union showed that when bees were used for the pollination of hothouse cucumbers the crop was increased 40 per cent. over that obtained through the hand-pollination method.

Science News Letter, July 22, 1939

GAS FOR FIRE

Using carbon dioxide gas experimentally for fire extinguishing, these firemen are forcing the gas through a hose with special nozzle into a closed room.

MEDICINE

Lung Collapse Most Effective For Treating Tuberculosis

Critical Study of Thousands of Cases Shows This Method To Be Twice as Effective as Any Other

COLLAPSE of the lung for persons suffering from tuberculosis has been found to be twice as effective a treatment as other measures directed against the control of the disease by the Chicago Municipal Tuberculosis Sanitarium.

A critical study of 7,341 cases is reported by Drs. Frederick Tice and Allan J. Hruby of the Chicago institution. (*Journal, American Medical Association,* July 8)

Of the 7,341 patients observed over a 6½ year period 3,090 were subjected to lung collapse for more than three months, 337 for less than three months and 330 had pneumothorax attempted. The other 3,584 patients were controls.

Broadly, the results were twice as good with the treated patients as with the controls and were better still in comparison with the life expectancy of patients with open tuberculosis as revealed in the medical literature.

In Chicago, the Municipal Sanitarium has clinics scattered over the city and 23.4 per cent. of the patients were treated exclusively at these clinics.

The survival rate for patients treated at the clinics was not quite as good as for patients treated exclusively at the sanatorium, 66.5 per cent. as against 75.9 percent. Those who were in both clinic and sanatorium fared best.

Drs. Tice and Hruby believe that in small communities where a sanatorium is not practical the addition of a few beds to the clinic will serve as well.

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MICA SUBSTITUTE

On a large crystal of mica, Oliver C. Ralston, of the U. S. Bureau of Mines, is holding a translucent sheet made from bentonite, with which he has been experimenting with a view to producing a mica substitute.

CHEMISTRY

New Film From Clay May Help Cut Imports of Sheet Mica

Film From Bentonite Is Almost Transparent, Fireproof, And Has Superior Electrical Insulation Properties

THE UNITED STATES may soon be able to replace most of its imports of valuable sheet mica with an American-made substitute, it appears from chemical discoveries reported to the American Chemical Society's colloid symposium at Stanford University.

The new mica substitute is Alsifilm, made from bentonite clays. Its development has been under way for some time and was first reported last year. The new advances and improvements were described in a paper presented by Prof. E. A. Hauser of Massachusetts Institute of Technology and Miss D. S. le Beau of the Dewey and Almy Company.

The new film can be made thin and almost transparent (looking like celluloid or Cellophane) and has superior electrical insulation properties. It is composed of inorganic materials that make it fireproof. Mica sheet is at present on the War Department's list of strategic materials of which the United States lacks adequate sources.

The bentonite clays are remarkable materials most commonly known for their ability when wet to swell to many times their dry size. One common use of bentonite is for sealing leaks in earth dams or in ditches. Wet bentonite closes the cracks. As it dries it shrinks, a little water penetrates, then it becomes wet and swells up again. This process is repeated indefinitely.

In the form of thin films bentonite is compressed strongly into a permanently stable material which is virtually impervious to water and does not swell as does bentonite normally.

As a substitute for sheet mica the new film may be expected to replace, to some degree, existing imports of this strategic mineral. In 1938 sheet mica imports amounted to 4,646 tons of unsplit mica and 1,115 tons of split mica. Total dollar value of imports of sheet mica in 1938 was $664,419.

Science News Letter, July 22, 1939

BIOLOGY

World's Greatest Wonder Is Rise from Cell to Human

WHAT is the most wonderful thing in the world?

The stars on a summer night? The fury of a storm at sea? Some gigantic work of engineering, such as Boulder Dam, Golden Gate Bridge, or Empire State Building? Some modern invention, such as the airplane, the telephone, the radio?

Dr. Edwin G. Conklin, the Princeton biologist, nominates for this honor the everpresent miracle of development, the marvelous complexities of a man or elephant issuing from so simple a beginning as a microscopic egg. If we did not know that it is true it would be incredible that the greatest men that have ever lived—Socrates, Plato, Aristotle, Newton, Darwin, Pasteur, Shakespeare, Goethe, Beethoven—were once babies, embryos and germ cells.

"All development, whether of animals or of men, consists in progress from a relatively simple to a more complex condition by means of increasing specialization or differentiation," Dr. Conklin explains. "Every higher animal or plant has come from an egg cell which contains none of the organs or parts of the adult, but which gives rise to these parts by the process of progressive differentiation.

"First of all, development occurs only in response to stimuli. The egg must be stimulated before it will begin to differentiate, and at every stage in development suitable stimuli are necessary to keep the process going. These stimuli may be either extrinsic or intrinsic. Extrinsic stimuli are found in food substances, proper temperature, moisture, etc., in the surrounding environment; the intrinsic stimuli are found in the constitutional or inherited needs and satisfactions of the organism. Every living thing has these needs and is eternally seeking their satisfaction.

"But development depends not only upon proper stimuli but also upon the appropriate response of the organism, and this is limited by its nature or heredity. No combination of stimuli can cause a hen's egg to develop into a duck and no amount of educational stimuli can convert a born fool into a wise man."

Science News Letter, July 22, 1939

The Old Stone Age in Europe lasted hundreds of thousands of years, but only about 100 skulls of its people have been studied and described by scientists.

PUBLIC HEALTH

Vaccine Against Horse Plague To Prevent Future Deaths

Four Stricken in Research on This Disease of Horses, Men and Perhaps Birds; Few Human Cases This Year

TRAGEDIES such as the death from horse "sleeping sickness" of Dr. Charles E. Salsbery, Kansas City, Mo., veterinary biologist who acquired the illness in the course of his scientific work, will probably be prevented in future.

A vaccine against the disease will be the means of preventing these tragedies. Such a vaccine already has been used successfully in protecting horses and a modified vaccine has been developed for human use. From 50 to 100 men and women who handle the dangerous virus in disease-fighting laboratories have already been vaccinated, according to information received by the U. S. Public Health Service.

The federal health service, when asked, has advised firms manufacturing the horse protective vaccine that they would be justified in using the horse vaccine to protect their employees so long as nothing better was available. Within the last month (June 9) the development of a vaccine suitable for human use was reported by Dr. Ralph W. G. Wyckoff of the Lederle Laboratories at Pearl River, N. Y. (*See SNL,* June 24)

Dr. Salsbery was the fourth to be stricken with the disease in the course of work on it. One other of the four, a girl laboratory technician, also died of it, the U. S. Public Health Service has learned. The name of the girl martyr and the laboratory where she was employed is withheld as being "confidential information."

Scientists and laymen alike were shocked at the announcement last fall of the first proved human cases of this horse ailment, which has the technical name of equine encephalomyelitis. Widespread outbreaks of the disease have occurred among horses. Cause of the sickness is a virus, and there are two different viruses, one the Eastern and one the Western type. The Eastern type is more fatal among horses and according to present knowledge is apparently more fatal among humans also.

A total of 38 human cases of the horse plague were reported in Massachusetts last year of which 20 were fatal. There were six cases with one death reported from Minnesota and one fatal case in a child reported from California.

How the disease spreads from horses to humans is still a mystery. According to one theory, the virus is spread by mosquitoes or other insects, some scientists believe that birds, rather than horses, constitute a reservoir of the disease from which it spreads to both horses and humans. None of these theories has been proved as yet.

So far this year there have been only a few cases of the disease reported among horses and none among humans except for the laboratory-acquired infections. Department of Agriculture officials point out that the disease among horses does not usually appear in epidemic form until the end of July, and so it is not possible to predict yet whether or not there will be any human cases. If there should be a bad outbreak among humans it is likely that one of the vaccines will be tried in the hope of preventing more cases and controlling the outbreak. At present, however, the federal health service is unwilling to make any recommendations on this point. The number of human cases reported last year are considered too few to warrant advising widespread vaccination of the human population.

Dr. Salsbery, latest victim of the horse plague, is said to have been in good health on June 7 when he was visiting scientists at the Department of Agriculture in Washington. It is believed that he had already acquired the infection before this visit, because he is said not to have been in any laboratories where cultures of the virus are grown but only in offices of scientists in Washington.

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PHYSICS

New Berkeley Cyclotron Passes Its First Tests

THE world's most powerful beam of atomic "bullets" for bombarding atoms has been generated in the new 60-inch cyclotron of the University of California.

In its first official test the new instrument, whose magnets alone weigh 250 tons, generated deuterons of 16,000,000 electron-volts energy. When the nuclei of helium are used for the "bullets" it will be possible to produce a beam of alpha particles having an energy of 38,000,000 electron-volts.

In a report to the *Physical Review* (July 1), an eight-man research team headed by Prof. Ernest O. Lawrence describe their success in the first test of the newest and most powerful atom smasher in any physical laboratory. Nor is the present energy the limit, for the scientists add:

"We . . . see no difficulties in the way of producing with the present equipment 25 million volt deuterons and 50 million volt alpha-particles, and moreover we are convinced that much higher energies could be obtained from a cyclotron of larger dimensions."

Prof. Lawrence has already suggested that a 1,000-ton cyclotron could be constructed to go to even greater energies. The present test substantiates in real performance his previous hopes.

So potent is the beam from the new cyclotron that its particles can be observed emerging in air from the target window for a distance of over a meter and a half, or about five feet.

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ENGINEERING

New Quick Freezing Method To Create New Industry

AN OPPORTUNITY for a new industry using the immersion process of quick freezing was described by John P. Ferris and R. Brooks Taylor, of the Tennessee Valley Authority, to the American Society of Mechanical Engineers meeting at San Francisco.

The process, which has been applied to fruits and berries in an experimental plant at Cleveland, Tenn., brings about very rapid freezing at zero Fahrenheit. A continuously operating unit, consisting of an endless, stainless steel belt running through a low temperature sugar solution and a centrifuge to remove the clinging particles of the solution, was designed and is in operation. Strawberries are frozen in six minutes and smaller products in less time.

A refrigerated barge was built in connection with the project. The paper states that the costs based upon a load of frozen fruit shipped from Chattanooga, Tenn., to St. Louis, Mo., in 1938, indicate astonishing economies.

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AERONAUTICS

Atlantic Air Crowded; 34 Plane Crossings

THE once-deserted air above the formerly lonely Atlantic Ocean is positively crowded with planes these days, a glimpse at the trans-oceanic flight tally this year shows.

By July 22, no less than 34 crossings will have been made by three airlines of two nations. This is ten more than were made in the summer of 1937, when German, English and American ships compiled the previous high mark of crossings for a single year.

Pan American Airways will have a total of 24 transatlantic flights by this date, divided among two survey trips, ten crossings on the Marseilles route and two on the Southampton run with mail, and seven Marseilles and three Southampton flights with passengers. Air France Transatlantique, French entrant, will have completed six crossings, two by the Ville de Saint Pierre and four by the Lieutenant de Vaisseau Paris, its survey flying boats. American Export Airlines' Transatlantic has made three crossings. Delivery of a twin-engined Consolidated flying boat similar to U. S. Navy patrol bombers to the British Air Ministry makes the thirtieth.

The 100th crossing this year will be made before the end of October if present plans of the different airlines are adhered to.

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BOTANY

Light Increases Resistance Of Plants to Killing Heat

MIDSUMMER heat beats down on the cornfields, and you wonder how the plants stand it. One would think they'd wilt, even when there isn't any drought, standing there hour after hour in the unrelenting sun. The torrid climax that comes between noon and about two o'clock seems especially lethal.

So it might be, if the sun did not with its light aid the plants that must later in the day stand up against the dark arrows of its heat. Exposure to light for a few hours materially increases the ability of plants to withstand heat, Dr. H. H. Laude of the Kansas Agricultural Experiment Station has found.

In ordinary experience the thing is done automatically. Light is turned on when the sun comes up, and the plant gets its parathermal toning-up in the cool of the forenoon. To separate the effects in order to make a more exact study of their relations, Dr. Laude grew several varieties of ordinary grain crop plants in rooms that could be lighted and darkened, heated and cooled, at will.

He discovered, for example, that if a 122-degree temperature were turned on to a plant that had just been taken out of darkness, it suffered much more than did a control plant that had been illuminated by forenoon sunlight for several hours before being exposed to the same degree of heat.

Artificial light appears to be as effective as sunlight in conferring this protection against heat. Plants kept under a 200-watt lamp over night showed only a little more than a third as much injury, after five hours' exposure to 120 degrees, as did plants that had been kept in normal night-time darkness.

The physiological mechanism of this parathermal action of light is still unknown. Dr. Laude suggests that it may be due to the formation of photosynthetic products in the plant, but he discounts his own suggestion.

Science News Letter, July 22, 1939

ASTRONOMY

Oxygen in "Empty" Space With Perhaps Other Gases

"EMPTY" space between the stars actually contains one of the two common gases present in the earth's atmosphere, oxygen, and it may also contain the other, nitrogen. Hydrogen is the third gas present in interstellar spaces in detectable concentrations.

First studies of remote interstellar "atmosphere" were announced at the meeting of the American Association for the Advancement of Science in Milwaukee by Dr. Otto Struve, director of Yerkes Observatory and of the new McDonald Observatory in Texas. It was at the latter institution that the studies were made, with a powerful new instrument known as the nebular spectrograph. Three-hour exposures were necessary, using specially sensitized photographic plates, to get "snapshots" of the faint glow of these gases of space, split up into the lines that tell of their chemical nature. Sixty-five such spectral photographs have been made. These gases, and indeed all kinds of drifting matter in the deeps between the stars, are of course very thinly spread out. Dr. Joel Stebbins of Washburn Observatory stated that light traveling through one mile of the earth's atmosphere loses more of its intensity through bumping into things than it would in passing through a quadrillion miles of interstellar space.

Science News Letter, July 22, 1939

IN SCIENCE

ARCHAEOLOGY

Greek-Style Drama Was Acted 1250 B.C. in Syria

IF GREEKS were Fathers of classic drama, Near Easterners of Syria were Grandfathers of the same type of artistic expression. It appears that they were acting "Greek" tragedy long before the Greeks.

The evidence consists of librettos of two sacred pantomimes. They are from the ruins of Ras Shamra on the Syrian coast, and are written on clay tablets in cuneiform alphabet letters. The very alphabet writing of Ras Shamra surprised archaeologists when they first encountered it, as they dug out the library collections of this dead city. Now, they are reading the old writings and learning more about backgrounds of psalms and other literary forms.

A British scholar, Theodor Gaster, first detected ancient playwriting technique in what might be taken for merely a narrative poem. Discussing the significance for drama history, in the British journal *Religious,* Mr. Gaster expressed wonder at the thought that this drama was "acted on the shores of the Mediterranean at about 1250 B. C.—fully seven centuries before the time of Aeschylus!"

The standard elements of Greek drama which he finds embodied in the ancient poem are: an opening prologue, originally choral; a combat between two principal characters, one being discomfited; a song of lament over the downed principal; a messenger describing the conflict, which happens off-stage; and a Deus ex Machina, who by divine intervention insures a happy ending.

The pantomime, which was current drama in Syria just about the time when Israelites were conquering Palestine to the south of it, is a religious tale of men and gods, the banishing of drought, and heaven-sent rain for the harvest. The poem has Semitic aspects which strengthen Mr. Gaster's theory that Ras Shamra traced cultural descent from Semites in the south of Palestine.

A second poem, which Mr. Gaster also regards as a drama, deals with "The Phoenician Legend of Daniel."

Science News Letter, July 22, 1939

NE FIELDS

PSYCHIATRY

Mental Patients Are Still Chained to Their Beds

HOW NEW is the science of psychiatry and how fortunate the United States is in its modern mental hospitals is emphasized by a report to the current issue of the *American Journal of Psychiatry* by Dr. E. Lennard Bernstein, Arlington Heights, Mass., physician, describing the treatment of the mentally ill in Syria.

There, in a city of 200,000 inhabitants, Dr. Bernstein visited a white stone two-story house which serves the mental patients of all that district. In charge, is an Arab of the upper laboring class who, with his two children aged eight and six years, serves as superintendent, chief psychiatrist and factotum of the house.

Patients are assigned mattresses placed around the walls of darkened rooms where ventilation is poor.

Opposite each mattress, sunk in the wall, is an iron ring. All "bad" patients are chained in place with a leg in the ring.

Plumbing, Dr. Bernstein found, was lacking. A pail of water and a common drinking cup provided for the thirst of patients. They washed their hands and feet in another bucket.

Medical supervision was entirely absent except when the keeper thought someone ready for discharge. Then government authorities must approve his judgment. In fact, Dr. Bernstein learned that in the whole district there was no neurologist or psychiatrist.

The diet in this hospital consisted of the left-overs from the National Hospital for medical and surgical patients nearby. This was a bowl of mush three times a day with rarely, as a treat, some bread and was fetched by one of the patients.

Since the keeper's authority was completely despotic, it was "fortunate for the patients," Dr. Bernstein said, "that he was a kindly and patient person. Discipline was entirely based on his personal influence and his thin stick, but he rarely had to strike anyone."

The more Europeanized province of Lebanon is fortunate in having a 350-bed modern psychiatric hospital, but this institution is the "only ranking psychiatric institution within a radius of almost a thousand miles" and draws patients from the upper classes of Egypt, Arabia, Persia and Turkey as well as from Syria.

Science News Letter, July 22, 1939

PHYSICS

Wind Tunnel Is Used To Classify Soil and Sand

IT IS common enough to think of wind tunnels as useful for study of better streamlining for airplanes, new high speed trains and fast motor cars. But did you know that scientists are now using wind tunnels to classify sand and soils as to the size of the particles in them?

In Pasadena, at the California Institute of Technology, scientists of the U. S. Soil Conservation Service and the Institute operate a wind tunnel for just this purpose and obtain a better separation of particles by size than they can do with ordinary sieves. Moreover, the method works better for the finer particle sizes; the place where sieves fail to yield best results.

The Caltech device sucks a stream of air through a twelve-foot tunnel. At the intake end the soil and sand mixture flows down into the air stream and is caught in the air currents. Heavy, larger particles fall quickly and are caught in special trays near the tunnel's entrance. The finer particles float more easily, travel farther and the finest the greatest distance of all.

Twenty different trays catch various particle sizes. The finest size corresponds to particles that can only pass through 250 mesh sieve. They have an average diameter of seven hundredths of a millimeter, or about 27 ten-thousandths of an inch.

Determining the particle size of soils and sands is an important fact needed for studies of soil erosion and conservation, either by wind erosion as in dust storms or in erosion by water. The size of particles, too, is important in studying the silting of lakes and water stored behind dams.

The Caltech device brings a new technique into the field which provides accurate data with a low cost for apparatus was built for about $50 and requires only one laborer to operate it.

George H. Otto and Hunter Rouse, assistant geologist and associate hydraulic engineer at the laboratory, describe the new wind tunnel method in the current issue of *Civil Engineering*, journal of the American Society of Civil Engineers.

Science News Letter, July 22, 1939

ANTHROPOLOGY

Three Ancient Peoples In American Southwest

THREE distinct ancient cultures, now called the Anasazi, the Hohokam and the newly-differentiated Mogollon, are recognized in the remains left by the primitive peoples of the American Southwest who, in this desert-like environment, built up some of the most advanced aboriginal civilizations of the New World. These ancient civilizations are described by Dr. Frank H. H. Roberts, Jr., in a bulletin just issued by the Smithsonian Institution's Bureau of American Ethnology.

One group, the Anasazi, including everything hitherto referred to the Basket Makers and Pueblo builders, were scattered along the San Juan, Rio Grande, Upper Gila, Salt, and Little Colorado Rivers and through a good deal of Utah and eastern Nevada.

A second culture, the Hohokam, were mostly dwellers in the lowlands. Differences between these two are striking. The Anasazi buried their dead; the Hohokam practiced cremation. The Hohokam built rectangular, single-family houses of poles, brush and plaster, while the Anasazi progressed from these to the great stone "apartment houses" whose ruins may be seen today. The Hohokam dug extensive canal systems; the Anasazi depended mainly on flood water irrigation. The Hohokam domesticated the turkey; the Anasazi did not.

The third culture, the Mogollon, centered in the San Francisco and Mimbres valleys in southwestern New Mexico. These people practiced hunting to a far greater extent than the other two peoples. They first lived in rounded, semi-subterranean houses and gradually developed Pueblo type dwellings. They usually buried their dead, but there are some instances of cremation.

These three cultures progressed side by side for many centuries. Each was more or less influenced by the others and all three were influenced by the changing climatic conditions.

The Anasazi history may be dated from the timbers which show that one great dry period was responsible for a trend toward urban communities and another was an important factor in the abandonment of some of these centers. The greatest expansion and growth in one of the leading centers took place in a twenty-year period when conditions were favorable.

Science News Letter, July 22, 1939

ASTRONOMY

Planet Mars Comes Close

It is Mere 36,030,000 Miles Away on July 27, But Don't Expect Martians For They Don't Exist

By WATSON DAVIS

MARS, the ruddy planet shining brighter than any star in the southeastern sky of the early evening, is making its closest approach to earth in 15 years. On July 27 at 4 p.m. (E.S.T.) it will be only a mere 36,030,000 miles away. The moon is only about 1/150th that distance.

But don't expect a visitation of Men from Mars. Don't even expect most astronomers to be more interested in this astronomical event than they were last October when Orson Welles dramatized H. G. Wells' interplanetary fantasy. (Astronomers with dramatic critic leanings criticize Orson Welles' timing because Mars last October was several times farther away than now.)

Anew there is sure to be more discussion about the possibility of life on Mars. Meaning to most people, some sort of life like ourselves. Whenever Mars comes closer to earth this question is agitated.

"Mars, the pagan god of battle, instigated the disputes of man and the wasting of his blood," Dr. Harlow Shapley, director of Harvard Observatory, once said. "Mars, the neighboring planet, continues to incite disputes for the scientist and the wasting of his ink."

Most conservative astronomers feel that the changes in tint observed in certain areas of Mars may safely be regarded as seasonal changes in vegetation. There is also a cyclical shrinking and expanding of the polar caps with the Martian seasons, which if of snow and ice, would contribute to seasonal vegetational changes. Since vegetation is a form of life, most astronomers will agree that there is probably life on Mars. But it is life of a low order, not necessarily intelligent life.

Canals on Mars?

The idea of intelligent life is bound up with the supposed "canals" of Mars. Not over 15% at the outside of modern astronomers, Dr. Heber D. Curtis, director of the University of Michigan Observatory, estimates, believe in the existence of the long, straight and narrow markings first reported in 1877 by the Italian astronomer, Schiaparelli. He called them "canale," which should have been translated into English as "channels" connecting supposed Martian oceans. Unfortunately the word was actually translated as "canals," which suggests artificial construction. Hypothetical inhabitants were created to perform these great feats of engineering skill and the strange race of Martians was born of popular and literary imagination.

Prof. Percival Lowell in 1894 built an observatory at Flagstoff, Ariz., for the express purpose of studying the planet and its canals. He died firm in the belief that his drawings of the canals were realities, that they were the work of intelligent beings, and that they were constructed to carry down the water of the polar caps to irrigate the equatorial regions of the slowly dessicating planet.

Photos Don't Show Them

Whether these canals actually exist is one of the major controversies in astronomy with the vast majority of astronomers voting that they do not. Many admittedly keen-eyed observers cannot see them. Significant is the fact that photographs, even with the largest telescopes, do not show them. Much of the work on Mars has been done with small telescopes by observers who made drawings of what their eyes beheld. The skeptics have made experiments with random dots and markings on paper that show that the brain and the human eye play queer tricks when straining to look at something just beyond visibility. Physiological and psychological effects may build up "canals" out of random shadings and features too minute to be separately distinguished. And maps of Mars by Schiaparelli and Lowell show wide divergence in detail.

Despite the fact that Mars is the next to the nearest planet to earth, it is not a striking object. Even as seen with the aid of a large telescope, Mars looks like a small orange about five yards away. To the unaided eye it looks as large as a 6-foot man ten miles away.

The diameter of Mars is only a little more than half that of the earth. Gravity at its surface is 35% that on earth; a 150-pound earth dweller would weigh 52 pounds on Mars. Water would boil at 110 degrees F. instead of at the earthly 212 degrees. The Martian atmosphere is one-twelfth the density of air on earth. Whether there is much water or oxygen is doubtful. Mt. Wilson Observatory experiments, when Mars was fairly close in 1936, failed to detect water vapor in the equatorial regions of the planet. Its temperature may not be very different from inhabitable localities on earth. Various observations of Martian noon-day temperature range from temperate climate temperatures late of a February day to that of an April day.

Because it is low in the sky as seen from American observatories, observations at this close approach are not likely to be very fruitful. Added to the general astronomical indifference to the ruddy planet, this poor position of Mars will probably result in little new knowledge being gained through American telescopes this year. No observer in our northern latitudes can hope to see this year any of the so-called "canals."

From observatories located in the southern hemisphere there are more chances of satisfactory observations.

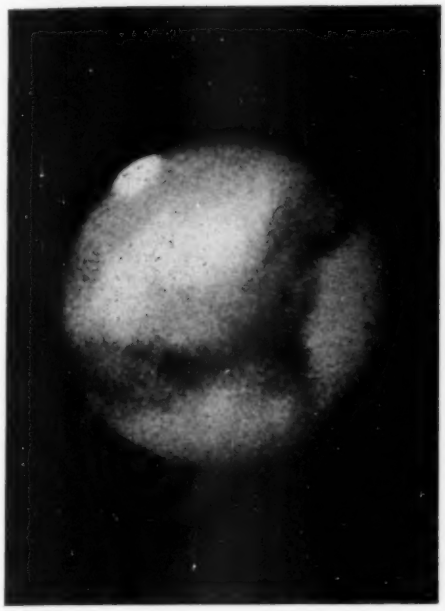
The principal American study of Mars this year will be made from Bloemfontein, South Africa, where the remarkably fine 27½-inch refracting telescope of the Lamont-Hussey Observatory, operated by the University of Michigan Observatory, will be put at the disposal of Dr. E. C. Slipher of Lowell Observatory to add to the long-continued and famous observations begun by the late Prof. Lowell himself. From South Africa, Mars will be almost directly overhead, only two degrees from the zenith.

Red Sensitive Photos

New photographic plates more sensitive in the red part of the spectrum will be used in Mt. Wilson Observatory observations. Direct photographs will also be taken with the giant Mt. Wilson telescopes.

Harvard Observatory is planning no special program, although its Boyden station in South Africa is expected to make some observations.

The University of California's Lick Observatory on Mt. Hamilton, Calif., does not plan a major program of observations.



MARS

This photograph made at Yerkes Observatory at the time of a previous close approach shows the planet that has been the subject of so much discussion among astronomers and laymen.

The new 82-inch McDonald Observatory telescope, world's second largest, on Mt. Locke, Tex., recently dedicated, will be used on Mars for the first time. A special camera has been built for this purpose.

Color photographs will be taken with the 40-inch reflector of the U. S. Naval Observatory at Washington and the planet will also be observed visually with the historic 26-inch lens telescope.

Science News Letter, July 22, 1939

MEDICINE

20,000 Fever Treatments Of 4,000 Patients Surveyed

THE IDEA of deliberately giving a sick person a high fever in order to cure him is such a contradiction of old established ideas about illness and its treatment that it is no wonder it has attracted wide attention among laymen as well as physicians.

Fever treatment has been tried for a great variety of ailments and much knowledge about its use has accumulated in the past eight or ten years, during which the method attained popularity. An analysis of some 20,000 treatments given to over 5,000 patients was presented by Dr. John D. Currence, of New York Post-Graduate Medical School and Hospital, Columbia University, at the last meeting of the American Medical Association.

"Strongest indications" for giving fever treatment, according to Dr. Currence, are gonorrhea (fever treatment combined with the new chemical remedy, sulfanilamide, is suggested) and complications of gonorrhea such as arthritis, complications of syphilis (again in combination with chemical treatment), such as optic atrophy, paresis and locomotor ataxia; Sydenham's chorea, familiarly known as St. Vitus' dance; early multiple sclerosis; and certain types of rheumatic disorders. Favorable results have been reported in cases of intractable bronchial asthma, undulant fever, encephalitis (so-called sleeping sickness), and a variety of skin ailments.

Fever treatment helps the patient get well, it is believed, by its effect on invading disease germs and by stimulating chemical and physiological reactions in the patient's body. It either kills germs or checks their growth and mobilizes some of the body's germ fighters. It causes dilation of the blood vessels, increased velocity of the blood flow, an increase in pulse and breathing rates, and an increased volume output of the heart. The blood-cell producing system is stimulated.

Conditions in which this treatment should not be used include heart and blood vessel and kidney disorders, pregnancy, active tuberculosis, alcoholism and general debility.

Science News Letter, July 22, 1939

PHYSICS

Physicists May Have New Link Between Atoms and Gravitation

Decay of the Mesotron May Provide Long-Sought Connection Betwen Atomic and Large-Scale Forces

OUT of the discovery of the mesotron particle, now shown to be the piercing component of cosmic rays, science has come across a new dimensional constant that may be the long-sought, never-found connecting link between small-scale atomic forces and large gravitational forces.

In a significant report (*Nature,* July 1), Prof. P. M. S. Blackett of Manchester University, describes the new constant which is the mean "life" of the mesotron particle at rest. It turns out to be 25 ten-millionths of a second (2.5×10^{-6} seconds).

The mesotron is the heavyweight kind of electron that spontaneously disintegrates with extreme rapidity; so fast in fact that it is only with extreme difficulty it can be detected.

"It is more convenient to consider not the average life," says Prof. Blackett, "but the related fundamental length which equals 7.5 times 10^4 centimeters."

This length comes out to be 2,460 feet and is obtained by multiplying the "life" time by the speed of light.

If the length of 2,460 feet (which is the average distance traveled by the average mesotron before it disintegrates) is to be related to the other natural constants like the charge on the electron, Planck's constant and the speed of light, "it is clearly necessary to include the gravitational constant G," says Prof. Blackett.

In calculations involving the gravitational constant of mesotrons, Prof. Blackett is able to work backward and compute the average path-length of travel of a mesotron. It comes out to be of the same order of magnitude as that obtained from physical measurements.

"It would be attractive to conclude from this result that perhaps the decay of the mesotron may provide a link between atomic and gravitational phenomena," says the British scientist.

There is one possibility which might make his whole argument invalid, explains Prof. Blackett. It is the unlikely possibility that the life-time of the mesotron as measured in the earth's atmosphere may not be the same as that in free space, but may depend on local conditions such as local gravitational fields, or electric and magnetic forces.

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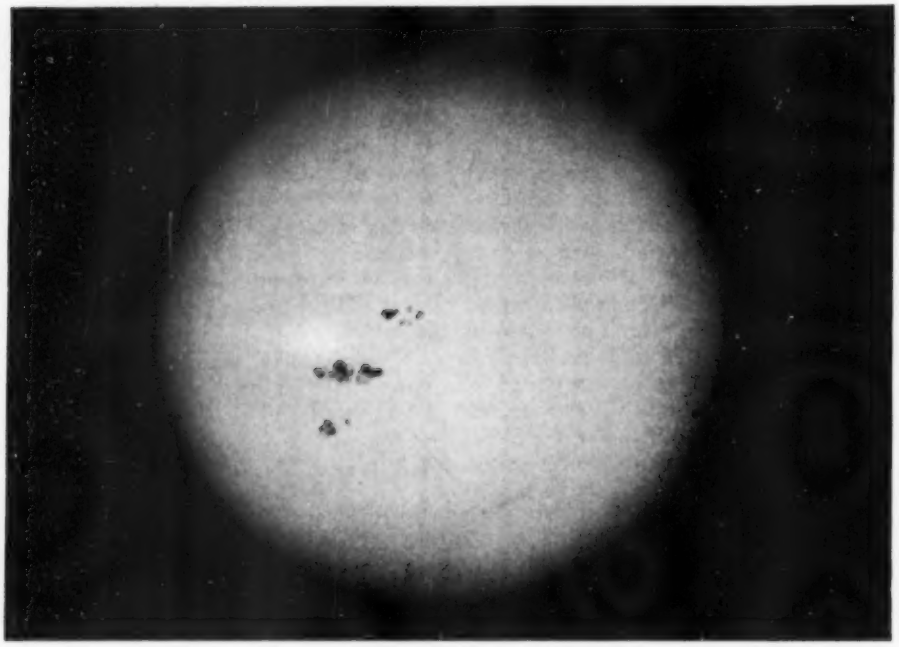
●RADIO

Robert P. Shaw, director of the New York Museum of Science and Industry, will be the guest scientist on "Adventures in Science" with Watson Davis, director of Science Service, over the coast to coast network of the Columbia Broadcasting System, Monday, July 31, 5:45 EDST, 4:45 EST, 3:45 CST, 2:45 MST, 1:45 PST. Listen in on your local station. Listen in each Monday.



SUNSPOTS

This great disturbance visible on the face of the sun on July 7 is the largest group of sunspots seen in recent months. It was photographed at the U. S. Naval Observatory.

AERONAUTICS

Autogiro Mail Line Opens at Philadelphia

AMERICAN aviation hangs up another first with the establishment of the world's premier "windmill airplane" airline, which has started shuttling airmail between Camden airport, the Philadelphia flying field, and the Philadelphia post office.

Not only does Eastern Airlines' "land-on-a-dime" Kellett autogiro haul 400 pounds of mail in five minutes a distance a mail truck requires a half hour to negotiate, but it promises a solution to the big city airport headache as well. The autogiro lands on the post office building roof.

With mail successfully ferried today, passengers will be carried just as quickly and easily tomorrow. Autogiros cannot now carry loads large enough to accommodate the number of passengers that can be fitted into an airliner, but the autogiro is a young bird yet. It will grow up just as its conventional airplane sister has.

Large cities are now faced with two unpleasant alternatives in building their airports because of the space required for takeoff and landing of the larger planes. The city must either pay high prices for an airport site handily located or passengers have to put up with a 30- to 50-minute car or cab ride from business districts.

Getting to and from an airport can actually take more time than making the flight itself, particularly for shorter distances. For example, a New York to Philadelphia flight takes about 40 minutes. But getting to Newark airport and from the Camden airport requires more than an hour. A man in a hurry under such conditions can do better by taking a train.

Science News Letter, July 22, 1939

Experiments at Cornell University show that two species of mosquitoes can transmit fowl pox to healthy birds.

There are only about 600 miles of divided highways in the United States, to separate oncoming streams of traffic.

Chemists have discovered that with the proper strength of brine southern cucumbers can be made into firm pickles.

ASTRONOMY

Huge Sunspot Cluster Sweeps Across Sun's Face

A HUGE cluster of sunspots, so large that more than a dozen earths could be dropped into them, have been sweeping across the face of the sun, it is disclosed on photographs taken at the U. S. Naval Observatory. This is the largest group seen in recent months.

Three of the spots, with smaller satellite spots nearby, were lined up in an east-west direction across the sun. Not far away was a fourth group of three small spots arranged in the form of a triangle. All of them passed sun's meridian line about July 8 and disappeared off the western edge of the sun about July 15.

If they keep their shape they should reappear again on the sun's eastern side near the end of July. The period of rotation of the sun, which determines the speed with which sunspots appear to move, is about four weeks as seen from the earth.

Science News Letter, July 22, 1939

ENGINEERING

Create Mechanical Power From Burnt Fuel Gases

THE ENGINEER'S answer to fears of wartime bombings, that would cripple city power plants, is a new type gas turbine described at the meeting of the American Society of Mechanical Engineers at San Francisco.

Gas turbines fulfill the engineer's dream of turning the energy of fuel into mechanical power without the use of cylinders and pistons or steam boilers and all the other necessary parts of present day power units, Dr. Adolphe Meyer, widely known engineer of the Brown, Boveri and Company, Baden, Switzerland, said.

In the gas turbine the burned gases from the fuel strike the blades of spinning turbine and generate the power.

As applied for a bomb-proof power station in the city of Neuchatel, Switzerland, a 4,000 kilowatt gas turbine generator is buried deep underground in a tunnel only 60 feet long, 17 feet high and 26 feet wide. Since no water cooling is required for this new type gas turbine, the entire emergency wartime unit is sealed except for fuel and air intake lines and openings for exhaust gases and an electric power cable. Gone from the eyes of airplane bomb sights are the towering stacks and great buildings of

steam turbine electric plants now so common in cities.

Gas turbines too are finding peacetime uses. A powerful 2,000 horsepower locomotive that is only 60 feet long has been built for the Swiss Federal Railway. In contrast a new steam-electric locomotive recently built for the Union Pacific Railroad generates 2,500 horsepower but is over twice as long — 125 feet.

Two industrial uses are in steel and chemical plants where large amounts of waste gases are created that can now be turned into power. The same situation applies in oil fields where now wasted natural gas can be converted by gas turbines directly into electrical power for easy transmission and use.

Science News Letter, July 22, 1939

Earth Trembles

Information collected by Science Service from seismological observatories and relayed to the Jesuit Seismological Association resulted in the location of the following preliminary epicenter:

Wednesday, July 5, 5:41.2 p.m., EST

In region of Tonga Islands, about 600 miles south of Samoa in South Pacific. Latitude, 24 degrees south. Longitude, 179 degrees west.

For stations cooperating with Science Service in reporting earthquakes recorded on their seismographs see SNL, June 17.

PHYSIOLOGY

Find Enzyme That Protects Live Cells From Poison

Blood Cells Live After Dose of Potassium Cyanide When It Is Followed By Horse Liver Catalase

THE ISOLATION and crystallization of an enzyme of horse liver, a catalase, important because it protects living cells from poisoning and destruction by hydrogen peroxide which they form, has been announced at Cornell University.

Success in this research, elusive for many years to prominent Swedish and German chemists, has come to Dr. Alexander L. Dounce, department of biochemistry, and Orville D. Frampton of the graduate school.

Horse liver catalase is an important enzyme which protects all living cells from hydrogen peroxide, by-product of tissue oxidations. Hydrogen peroxide is a poison that destroys the cells.

There isn't room in the same test tube for certain combinations of horse liver catalase and hydrogen peroxide. The power and fast action of the catalase can be seen by watching a small quantity of it force hydrogen peroxide up the side of the test tube and over the top. In another demonstration, two flasks of diluted blood were placed side by side. The liquid in each was bright red. Into one flask was poured a small quantity of a deadly poison, potassium cyanide, and immediately afterward horse liver catalase was added. The liquid remained a bright red, foaming a little at the top. The catalase had destroyed the hydrogen peroxide formed when the potassium cyanide attacked the cells in the blood.

Into the other flask potassium cyanide was poured, but no catalase "policeman" followed to arrest the hydrogen peroxide which was formed, and the living cells were poisoned and destroyed. The liquid turned brown immediately.

Two years ago, Prof. James B. Sumner and Dr. Dounce obtained crystalline beef and lamb catalase. These two catalases are probably identical, but the horse catalase is more active. Undoubtedly if Sea Biscuit, a champion race horse, possessed only beef or lamb catalase he would not be able to run half as fast, but a slow-moving lamb or cow does not require such an active enzyme as the horse. The amount of catalase in an animal or plant appears to be related to the activity of the organism.

The horse liver enzyme is the only one thus far crystallized that has been found to contain iron.

Science News Letter, July 22, 1939

CHEMISTRY—PUBLIC HEALTH

Overcoming Health Hazards In Chemical Industries

MUCH has been said about the dangers that menace the health of workers in chemical industries—dangers which may increase with each new process that is developed, each new chemical that is brought into use. Now a chemist, Dr. Henry Field Smyth, of the University of Pennsylvania, tells how to overcome these health hazards in chemical industries.

"It is possible," he declares in a report to the American Institute of Chemists, "to use any essential chemical in industry with safety, provided we learn its potentialities of harm and how to recognize early harmful action, and provided we are willing to pay the price—in money, in equipment and in vigilance—to make and keep conditions safe."

Eight protective measures are discussed by Dr. Smyth. First is substitution of a similar but less toxic material. This is not a good method, he says, pointing out that it is much better to learn how to use safely a hazardous material than to discard it for a possibly less useful substitute often of unknown toxicity.

Second measure is installation of exhaust ventilation adequate to remove toxic materials at the point of production before they have a chance to penetrate working atmosphere.

Third measure is isolation of processes so as to avoid the risk of general plant exposures.

Fourth, shorten unnecessary exposures of unprotected men and alternate dangerous jobs with safe ones.

Fifth, provide for personal protection of workers by adequate respirators, positive pressure air helmets, protective non-absorbent clothing and protective skin applications.

Sixth, see that safe devices remain safe and are kept in good order.

Seventh, examine employees before employment and exclude those likely to be particularly susceptible.

Eighth, have periodic physical examinations of employees to detect early signs of trouble in time to remedy it.

Science News Letter, July 22, 1939

A doorway in a ruined building at Karnak, Egypt, is 60 feet high and 23 feet wide, and the double doors must have weighed 12 tons each.

BOOKS

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PUBLIC HEALTH

NATURE RAMBLINGS
by Frank Thone

Wings for Plague

BUBONIC plague, like other forms of death in these days, has apparently taken to air travel. Not on the man-made wings of airplanes, but on the wings of hawks, owls, crows and other predatory and scavenger birds, says the U. S. Public Health Service.

The suggestion comes from William L. Jellison, assistant parasitologist at the Rocky Mountain Laboratory of the Service. Thirty years ago, Dr. W. C. Rucker made a similar suggestion, but limited it to one species of burrowing owl that shares habitations with the ground squirrels and other rodents that carry fleas which are in turn the ultimate carriers of the plague germs. Mr. Jellison, however, greatly extends the list of suspected birds, to include two species of hawks, two of falcon, three of owl and one species each of eagle, magpie and crow.

All these birds prey abundantly on the plague-carrying rodents. The scavengers, like crows, devour their catches on the spot, but predators, like hawks and owls, carry the carcasses to their nests, with the possibility of distributing the fleas either on the way or after they arrive. In several cases, these flesh-eating birds were observed in attacks on rodents dead or dying of the plague.

Science News Letter, July 22, 1939

ETHNOLOGY

Indians Get Back Skulls, Say Drought is Foiled

THE Water Buster Clan of Hidatsa Indians in the northern Plains has got back its bundle of sacred skulls. And ever since it got them back from the museum in New York, there has been plenty of rain.

This is the gist of a speech by Charley Snow, member of the Water Buster Clan, which ethnologists have recorded by phonograph.

The Indian experience of getting back the sacred bundle of skulls, as told to Zellig Harris and C. F. Voegtlin, began ten years ago. There was drought in the upper Missouri country. Hidatsa Indians began to say that they never should have sold their sacred bundle of skulls twenty, or maybe thirty, years ago. After the sale to that museum, it got very dry.

"We wanted to get our skulls," explains Charley Snow in his own language, "but it was difficult for us. The people of the other (clans) helped us; they caused dances to be held; they gave away things; they collected money."

Having raised $400 by benefits and donations, the Indians named a committee to go "by the edge of the ocean in the city of New York, as our skulls were in that place."

And the happy ending: "Now having brought back the skulls, thereafter ever since it rained; even grass begins to be plentiful; even things which grow become good."

The two ethnologists recording this say that the skulls are proudly referred to by the Water Busters as a triumph of religious power. Clan members and others come to view the powerful objects.

"When ushered into the presence of the skulls," the ethnologists report, "one must not stand; one sits quietly and prays; then before leaving it is proper to place a present of cloth or money before the skulls."

This old, native American handling of present-day drought problems becomes a new scientific document for study of Hidatsa language. The phonograph record of Charley Snow's speech accompanies a report on "Hidatsa Texts" and his story will be heard again and again where language students struggle with stresses and sounds of his native speech.

Science News Letter, July 22, 1939

CHEMISTRY

Six Soap Solution Types Now Known to Science

FOUR or possibly six new types of soap solutions—some with potential commercial importance—have been discovered at the chemistry department of Stanford University, Dr. Robert D. Vold of Stanford reported before the American Chemical Society's colloid symposium.

The new discoveries came out of the simple question: What happens when hot or cold water is gradually added to powdered soap? Soap owes its cleaning power to the fact that dilute solutions of substances known as "colloidal electrolytes" (soap is one kind) dissolve many different kinds of materials that would be insoluble in water alone.

Any improvement in the properties of soap, Dr. Vold said, depends in part on identifying the particular forms of solution obtained by mixing water with sodium oleate (soap). Until recently only two forms of soap solutions, known commercially as middle soap and neat soap, were known. Dr. Vold's research has disclosed another four forms and possibly two more besides.

Not all of these newly-discovered forms have commercial applications, said the Stanford scientist, because some of them can exist only at temperatures above the boiling point of water and hence are not useful in laundering.

Science News Letter, July 22, 1939

The population of Soviet Russia has more than doubled since 1926, the new census indicates.

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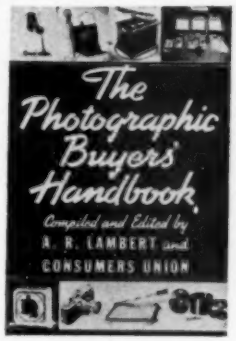

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First Glances at New Books

Ornithology

THE MIGRATION OF AMERICAN BIRDS—Frederick C. Lincoln—*Doubleday, Doran,* 189 p., illus., $4. There are bird books a-plenty, but a special account of one of the most interesting and puzzling of bird phenomena, migration, has hitherto been lacking, save at the more technical level. This book, by a veteran worker in the U. S. Biological Survey, supplies the need most excellently; it really tells all the main facts now known about bird migration, and does so in plain English that any intelligent reader can understand. There are many fine color plates by Fuertes.

Science News Letter, July 22, 1939

Forestry

ELEMENTARY FORESTRY MENSURATION—M. R. K. Jerram—*Nordemann,* 124 p., $2.45. A compact, practical book, useful alike as a teaching text and as a reference work for the practical forester and lumberman.

Science News Letter, July 22, 1939

General Science

REPORT FOR THE YEAR 1937-38—Department of Scientific and Industrial Research—*British Library of Information,* 203 p., 90c. The report of a year's research under British Governmental auspices of various governmental agencies as well as research associations.

Science News Letter, July 22, 1939

Physics—Chemistry

MOUVEMENT BROWNIEN. II, PARTIE THÉORIQUE—J. Duclaux—*Hermann & Cie,* 106 p., 30 fr.

Science News Letter, July 22, 1939

Architecture

LEGAL PROBLEMS IN THE HOUSING FIELD—Horace Russell and Leon H. Keyserling—*Govt. Print. Off.* 76 p., 25c. (National Resources Committee, Housing Monograph Series, No. 2)

Science News Letter, July 22, 1939

Bibliography—Home Economics

INDEX TO THE LITERATURE OF FOOD INVESTIGATION, Vol. 10, No. 2, September, 1938—Agnes Elisabeth Glennie, comp.—*British Library of Information,* 187 p., $1.35.

Science News Letter, July 22, 1939

Hygiene—Sport

TRAINING FOR CHAMPIONSHIP ATHLETICS — C. Ward Crampton—*Whittlesey House,* 303 p., $2.50. Here is a book that will appeal to every boy and a good many fathers. The author is a physician who knows how muscles and other parts of the body work and how to use them most effectively in athletics or any other physical activity. The book is full of practical, specific instructions for training for various sports and is enlivened by many stories about champions themselves.

Science News Letter, July 22, 1939

Library Science

PROFESSIONAL SCHOOL AND DEPARTMENTAL LIBRARIES—Walter Hausdorfer—*Special Libraries Association,* 24 p., $1. An analysis, by the librarian of the School of Business of Columbia University, of specialized libraries in professional schools, and within universities.

Science News Letter, July 22, 1939

Engineering

ENGINEERING MATERIALS—Alfred H. White—*Edwards,* 250 p., $3. The properties of materials like the metals, rocks, clays and silicates which go into the many structures which surround man on every hand in his modern civilization. Publication is by lithoprinting.

Science News Letter, July 22, 1939

Chemistry—Economics

FOOD INDUSTRIES MANUAL, 1939—*Chemical Pub. Co.,* 234 p., $4. A technical and commercial collection of information on the manufacture, preserving, packing and storage of all food products.

Science News Letter, July 22, 1939

Engineering

AIR CONDITIONING ENGINEERS' ATLAS—Clifford Strock and C. H. B. Hotchkiss—*Industrial Press,* 72 p., $2. Here is geography for air conditioning engineers; for in a series of 18 maps the weather data pertinent to the profession are arranged by geological locations. The highest temperatures ever recorded in 100 cities throughout the country, the lowest temperatures, number of heating days per year, frost penetration and other similar information are presented.

Science News Letter, July 22, 1939

Mathematics

AN INTRODUCTION TO VECTOR ANALYSIS FOR PHYSICISTS AND ENGINEERS—B. Hague—*Chemical Pub. Co.,* 118 p., $1.50. As lecturer in electrical engineering at the University of Glasgow, Dr. Hague gives a concise summary of this branch of mathematics with emphasis on the solution of practical problems.

Science News Letter, July 22, 1939

Medicine

YOU'RE THE DOCTOR—Victor Heiser, M.D.—*Norton,* 300 p., $2.50. Health advice and information illustrated with accounts of many interesting cases and incidents drawn from Dr. Heiser's long and varied experience in medicine and public health.

Science News Letter, July 22, 1939

General Science

THE MARCH OF MIND; A Short History of Science—F. Sherwood Taylor—*Macmillan,* 320 p., $3. For a concise and readable account of the growth of science from the Stone Age to our own times, this volume of British origin is recommended. Not a reference book, the book shows the changing attitude of man to science, and of science to the external world it studies. It forms a convenient spring board to more detailed interest.

Science News Letter, July 22, 1939

Mathematics

BASIC PRINCIPLES OF ANALYTIC GEOMETRY—Walter A. Spencer—*Orthovis,* 27 p., $2.20. Stereoscopic pictures of three dimensional models enable the student to visualize standard forms of this branch of mathematics.

Science News Letter, July 22, 1939

Sport

KEEP FIT AND LIKE IT—Dudley B. Reed.—*Whittlesey House,* 325 p., $2.50. This is a book for those adults who keep saying they ought to get out and get some exercise, but who rarely act on this idea. The author tells why exercise is good for one's health, gives instructions on a number of sports suited to the average adult, and tells how to enjoy exercise instead of taking it as an irksome duty.

Science News Letter, July 22, 1939

Home Economics—Medicine

YOU CAN'T EAT THAT!—Helen Morgan—*Harcourt, Brace,* 330 p., $2.50. The "one man's meat is another man's poison" people are gradually coming into their own. No longer laughed at, they are now even having special cook books written for them. Instead of being classified according to allergic substances, the recipes in this one are grouped in the usual cookbook arrangement of soups, meats, vegetables, desserts, etc. The list of ingredients in packaged and canned goods, found in this book, is a novel and very helpful addition to the recipes for home cooking.

Science News Letter, July 22, 1939